FILE FILOSOPHY

NICHOLSON FILE CO.,
PROVIDENCE, R.I. U.S.A.

FILE FILOSOPHY

BEING SOME HINTS REGARDING THE PROPER METHODS OF USING FILES AND THE VARIOUS APPLICATIONS OF THE MOST COMMON FILES

ELEVENTH EDITION
1920

PUBLISHED & PRESENTED BY THE
NICHOLSON FILE CO.
PROVIDENCE, R.I., U.S.A.
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NICHOLSON FILE CO.

FACTORIES AND BRANDS

The main factory of the Nicholson File Company is located at Providence, Rhode Island, where are also located the general offices of the company. This plant is the largest and the best equipped file and rasp manufactory in the world. Here are manufactured the famous Nicholson increment cut files, which for nearly fifty years have been accepted as the standard American file, and of which more are sold than of any other brand made. At this factory are also manufactured the X. F. Swiss Pattern files, designed to compete with the imported files of precision, and which have been rapidly supplanting the latter in this country owing to their superiority of temper, cut and adaptability.

At Anderson, Indiana, is the Arcade factory, and here are made the Arcade, American and Great Western brands.

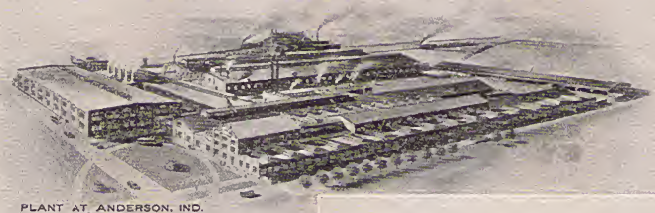
The Kearney & Foot, or K. & F. factory at Paterson, New Jersey, manufactures the Kearney & Foot, Eagle, McClellan, and J. Barton Smith brands.

In Canada we have a modern and fully equipped factory at Port Hope, Ontario, where we make for the Canadian trade a full line of files and rasps of the highest quality.

All these brands are first quality files.

PLANT AT PROVIDENCE, R. I.

PLANT AT PORT HOPE, ONT.



PLANT AT ANDERSON, IND.

PLANT AT PATERSON, N. J.

PREFACE TO EIGHTH EDITION

In 1878, Mr. William T. Nicholson, founder of this Company, wrote and published a complete "Treatise on Files," explaining therein the technicalities of files, defining their terms, and setting forth their uses, the processes of their manufacture, and the proper manner of handling them. This book has ever since been accepted universally as the authority in its line. File users have employed it as a practical guide in the art of filing, while mechanical experts and technical students have used it as a foundation for articles in the machinist and industrial press and for talks to the men in the workshop or class-room; it has even been supplied to other file manufacturers and its contents used by them in their catalogues and other publications. Whatever has been said or written upon the subject of files since the publication of that book has consisted simply of extracts or revisions of its contents. It has been circulated gratis throughout the world, and has passed through numerous editions.

The last edition of the Treatise has recently become exhausted, and the book is now entirely out of print. To satisfy the continuing demand for a book of that nature, however, and in response to the urgent requests of innumerable of our friends, we have taken those portions of the Treatise that are of most immediate value and interest to the user, viz: the general description of files, their common applications, and hints on filing—compiled and brought them up to date and added only such matter as has in our opinion been

necessary to cover changes in style, in methods and operations—in order to bring this treatise down to modern times. This we now present to those interested in files in the form of this little "File Filosophy." And in confining ourselves thus to the original, we feel, and, indeed, it is acknowledged that we are doing all that can be done since the Treatise cannot be added to or improved upon. The book is not intended to take the place of our catalogue,* but to accompany and supplement it.

The Filosophy is strictly impartial; its contents apply to all files alike, whether made by ourselves or by others, in this country or abroad. Naturally, we have confidence in our own products as best representing the perfect file necessary to secure the most nearly perfect results in filing; and we point with pride to the magnitude of our production and sales as evidence upon that point. But the value of a book of this kind would be diminished were the personal to enter too prominently into its pages, so we leave matters of comparative merit to the judgment of the great body of file users, and simply hand this little "Filosophy" to all interested, in the hope that it may be of service and therefore appreciated.

NICHOLSON FILE CO.,
SAMUEL M. NICHOLSON, President.

June 1, 1913.

*The catalogue referred to is our regular small catalogue, showing 600 illustrations of files and rasps and procurable gratis upon application.

OUR QUALITY

Did we deem it necessary, or even desirable, we might publish countless testimonials both from this country and abroad in praise of the steel, temper, cut, durability and uniformity of our brands of files and rasps. We consider, however, that the most effective recommendation of the superior quality of our products is the enormous and steadily increasing demand for them from all parts of the world, and the fact that, even with our immense production, we very rarely hear of a complaint being made against any of our brands on account of defective goods.

Every file and rasp produced by us is fully guaranteed.

TERMS DEFINED

BACK.—A term commonly used to describe the convex side of half-rounds, cabinets, pitsaws and other files of similar cross-sectional shape.

BELLIED.—A term used to describe a file having a fullness in the centre.

BLANK.—A term used to describe files in any process of manufacture before being cut.

BLUNT.—A term applied in describing files which preserve their sectional shape throughout from point to tang.

EQUALING.—A term applied to describe a blunt file upon which is produced an exceedingly slight belly or curvature, extending from point to tang, the file apparently remaining blunt.

FILING BLOCK.—A piece of hard, close-grained wood, having grooves of varying sizes upon one or more of its sides. It is usually attached to the work bench by a small chain, and, when grasped in the jaws of the vise, is particularly useful in holding small rods, wires or pins, which are to be filed; also in filing small flat pieces, which are held to the block by pins, or by letting in.

FLOAT.—The coarser grades of single cut files are not infrequently called floats, when cut for the plumber's use or for use upon soft metals or wood.

HOPPED.—A term known amongst the file makers, and used to represent a very coarse or open spacing of

the teeth, (sometimes exceeding ½") mostly applied to the backs of half-rounds and to the edges of quadrangular sections.

MIDDLE CUT.—A term used to designate the cut of a file when it is of a grade of coarseness between the rough and bastard. It is but little used in this country.

OVER CUT.—A term used to describe the first series of teeth on a double cut file.

RE-CUT OR RE-CUTTING.—The working over of old or worn out files by the several processes of annealing, grinding out the old teeth, re-cutting, hardening. etc.. and thus again preparing them for use. This operation is sometimes repeated two and even three times, but the economy of re-cutting at all is very much questioned, and the practice is done away with in most of the best appointed shops of the present day.

SAFE EDGE (OR SIDE).—Terms used to denote that a file has one or more of its edges or sides smooth or uncut, that it may be presented to the work without injury to that portion which does not require to be filed.

SCRAPING.—As applied in machine shops, the process consists of removing an exceedingly small portion of the wearing surfaces of machinery by means of scrapers, in order to bring these surfaces to a precision and nicety of finish (as determined by the straight edge or surface plate) not attainable by the file or by any other means with which we are acquainted.

SET.—To file off or blunt the sharp edges or corners of file blanks before and after the first or over cut is made, in order to prevent weakness of the teeth and consequent liability to break when put to use.

SUPERFINE (OR SUPER) CUT.—A term applied by the Lancashire file makers to designate a grade of cut designated by us as Dead Smooth.

SURFACE PLATE OR PLANOMETER.—Consists of a close-grained and hard cast iron plate, usually strengthened by three principal ribs, and supported upon three feet or bearing points; having one or more of its faces made as smooth and as true as can possibly be done. They are used as trial plates for testing and correcting other surfaces.

TAPER.—This term is used to denote the shape of the file, as distinct from blunt. Custom has also established it as a short name for the Three-Square Handsaw File.

UP CUT.—A term used to describe the series of teeth superimposed on the over cut series of teeth on a double cut file.

HINTS AND SUGGESTIONS AS TO THE PROPER METHOD OF USING FILES

Very few mechanical operations are more difficult than that of filing well. Unlike the tool fixed in the iron planer, whose movement is guided by unyielding ways, the file must be guided by the hand, and the accuracy with which this is done will depend largely upon the patience and perseverence given in practice; the "guiding principle," involved in many other tools and operations, being wanting in most applications of the file.

PERFECT FILE NECESSARY

While a perfect file is necessary to secure the best results in filing, the workman's success depends very largely on his ability to select the proper shape and cut of file for the work he has to do, together with his ability to use it properly. There are but few generalities that may be given with any idea of practical value to the beginner. The school of experience is where he must acquire the ability to become an expert. From the *list of files and their uses,* (See pages 29-45.) a general idea may be had that will assist in making the proper selection of the file to use. The description of cuts will help to determine the proper cut.

A SEVERE TEST IN FILING

A severe test in filing would consist in producing a true flat surface upon narrow work, or say that whose

width does not exceed one-eighth the length or stroke of the file. To the uninitiated this would seem to require that the file should have a perfectly true and straight surface, but were it practicable to make the file absolutely flat and true, it would then be necessary to move it in absolutely straight lines across the work; even were this operation possible, the pressure, if applied to each end of the file, as is the usual custom, would give it sufficient spring to cause a slight concavity to its cutting surface, and thus an inevitable rounding to the surface of the work must be produced.

Therefore, to produce a flat surface under this severe test, or even under more favorable circumstances, the file should have a convexity given to its surface.

Convexity in Files

Undoubtedly, few, even of the old filers, have given the subject of convexity as it bears upon broad surface filing the thought it is entitled to. It is known to many mechanics that a file which will bite and cling, with the accustomed downward pressure, upon wrought iron or soft steel will require a greater pressure to prevent it from glazing or slipping over the work, when applied to broad cast iron surfaces. This is owing to the glassy nature and extremely granular formation of these surfaces; consequently the teeth should enter the surface deeper than in the more fibrous metals or they will soon glaze over and become dulled or shiny, thus giving to the file the appearance of being soft, while the contrary may be the fact. Many a well hardened file

has been called soft because the operator has failed to give it a fair chance.

Considerable convexity is, therefore, needed in such cases; for while it gives greater control of the file from point to heel, it also presents fewer cutting points to the work with a given pressure downward than the less convex file—the bite being increased in proportion to the increase of the convexity. The ability, therefore, to increase it more or less, at the will of the operator, is of considerable importance.

In finishing many kinds of work, the absence of a suitable convexity limits the usefulness of the file—as in the preparation of the valves of steam engines, tables of printing presses, stereotype plates, or other work requiring a true surface.

While an absolutely true surface is confessedly unattainable, it is evident that, as in the above cases, a degree of perfection is sometimes desirable beyond what the necessities of other work may require; and to be able to touch the exact spot indicated by the straight edge or surface plate with the file, is to utilize it in a manner which could not be done if the convexity did not exist.

Files Properly Handled

When the proper selection has been made, before using the file it should first of all be properly handled; i. e., a handle of the proper size with the proper size hole, drilled straight, should be fitted to the file, not, as is too often the case, by driving the handle half way down the

tang and thereby doubling the chances of breaking it, but by forcing it well up to the shoulder, thus enabling a suitable grip which is essential to a proper guiding and control of the file. It not infrequently happens that the tang hole is not drilled central or is badly out of line, or does not properly fit the tang of the file; in such cases the tang of an old or worn out file of similar dimensions should be heated, taking care, of course, not to draw the temper, and the hole in the handle burned out to nearly the desired size and shape, before driving it upon the tang.

Of the many file handles of special construction hitherto devised, there are none which have, as yet, combined that simplicity, utility, and economy necessary to take the place of the ordinary wooden handle; nor do we think it possible to improve for most applications of the file, upon a wooden handle that is conveniently formed and properly ferruled, provided it be firmly affixed and carefully used.

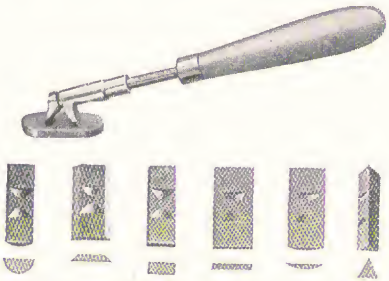
Devices for Holding Files

The file, when used in the ordinary manner, considerably exceeds the length of the work; but when such is not the case, as in filing large table surfaces and shaping out recesses of considerable length, or when, from other causes, the ordinary handle will not answer, it then becomes necessary to grasp the file by holders of special construction. These special devices (many of which are quite rude) are numerous, and vary to suit the particular shape of the file and the work to be performed.

Short pieces of files of special construction are sometimes clamped to the slide rest, to be used upon work revolving in the engine lathe, and are soldered or screwed to bent handles when required to be used in finishing in and around the bottoms of shallow cavities.

STUB FILE HOLDER

The necessity, however, of this last and troublesome method of holding the file may be avoided by the use of the Stub File Holder.



Wood workers not infrequently clamp one or more files to pieces of board, or fasten them by means of staples and wire pins, or by cutting in, in such a manner as will enable them to smooth out grooves, or true up the edges of their work, using the board or holder as a gauge.

Bent Rifflers are sometimes required in reaching certain irregularly shaped cavities.

Filing Large Table Surfaces

In filing large table surfaces, the tang is frequently bent upward to admit of the hands clearing the work when the file passes over the surface; sometimes a crank-shaped holder is employed, having one end fitted to the tang of the file while the other is fitted to receive the handle. These devices, while facilitating somewhat the handling of the file, do not give that perfect control which enables the operator to manipulate it at will. nor do they aid in governing its convexity.

The Improved Surface File Holder, herewith illustrated, is designed, especially to meet these points, thus enabling the skillful operator to do much of the work with the file which has hitherto been done with the scraper.

Height of Work

For filing in a vise the work should be held as rigidly as possible and the vise jaws should be placed so as to be level with the elbow of the workman, which will be found to range from 40 to 44 inches from the floor—therefore 42 inches may be considered as an average height, best suited for all heights of workmen, when the vise is to be permanently fixed. This position enables the workman to get the full, free swing of his

arms from the shoulder; the separate movement of the wrist and elbow should be done away with as much as possible.

If the work to be filed is small and delicate, requiring simply a movement of the arms, or of one hand and arm alone, the vise should be higher, not only in order that the workman may more closely scrutinize the work but that he may be able to stand more erect.

If the work to be filed is heavy and massive, requiring great muscular effort, its surface should be below the elbow joint, as the operator stands further from his work with his feet separated from 10 to 30 inches, one in advance of the other, and his knees somewhat bent, thus lowering his stature; besides, in this class of work, it is desirable to throw the weight of the body upon the file to make it penetrate, and thus, with a comparative fixedness of the arms, to depend largely upon the momentum of the body to shove the file.

Grasping the File

In using the larger files, intended to be operated by both hands, the handle should be grasped in such a manner that its end will fit into and bring up against the fleshy part of the palm below the joint of the little finger, with the thumb lying along the top of the handle in the direction of its length; the ends of the fingers pointing upwards or nearly in the direction of the operator's face.

The point of the file should be grasped by the thumb and first two fingers, the hand being so held

as to bring the thumb, as its ball presses upon the top of the file, in a line with the handle when heavy strokes are required. When a light stroke is wanted, and the pressure demanded becomes less, the thumb and fingers may change their direction until the thumb lies at a right angle, or nearly so, with the length of the file; the positions changing more or less, as may be needed to increase the downward pressure.

In holding the file with one hand, as is often necessary in filing light work, pins, etc., the handle should be grasped as already described, with the exception that the hand should be turned a quarter turn bringing the forefinger on top and lying along the handle nearly in the direction of its length. In this position, the freest action of the hand and wrist may be had upon light work.

Amateurs will find that by following these directions, the movements of the file will be simplified and made somewhat easier than if grasped at random and without consideration.

Carrying the File

The most natural movement of the hands and arms in filing is to carry the file in circular lines, the several joints of the limbs being the centres of motion; this movement of a convex file would apparently give a concavity to the work, but the real tendency, especially on narrow work, is the reverse, owing to the work acting as a fulcrum over which the file moves

with more or less of a rocking motion, giving an actual convexity to its surface except when in the hands of a skillful operator. The real aim, therefore, should be to cause the file to depart only so much from a true right line as will be necessary to feel that each inch of its stroke is brought into exact contact with the desired portion of the work; and by thus changing the course of the stroke slightly, thereby preventing "grooving," a more even surface results and the work is completed sooner.

The movements here referred to have reference to those in which both hands are used upon flat work, requiring nicety and trueness of finish, and the difficulties to be overcome in producing even a comparatively true flat surface with a file require much practice on the part of the operator.

In filing ovals and irregular forms, the movements, while not considered so difficult or trying, nevertheless require considerable experience and a good eye, so to blend the strokes of the file upon the round or curved surfaces as to give the best effect; the varied nature of the work upon this class of surfaces, though much might be said, prevents any detailed definition as to the movements of the file within the limit of this article.

In point of economy, the pressure on the file should be relieved during the back stroke; this will be apparent to anyone who will examine the formation of the points of the teeth, when it will be seen that the file can only cut during the ordinary or advancing stroke and that equal pressure during the back stroke must be very damaging to the points of the teeth.

Lathe Work, Etc.

For shafting or lathe work the file should be constantly stroked against the turning of the revolving work, applying the pressure to the forward stroke, relieving it on the return stroke and giving the stroke a slight gliding or lateral motion to assist clearance of chips and to avoid filing ridges or scores.

Machine Files

For machine filing a special file is usually required and, where any very hard service is called for, the formation of the teeth should be such as to meet this special work. It must be remembered that files are almost always made with the intention that they are to be used by hand. The natural tendency of the workman to apply the pressure as required—*to keep the file cutting or down to its work, using less pressure on the first strokes, (which prevents the finely shaped tooth point from being broken and dulled) and gradually increasing the pressure as the teeth lose their keenness*—is in contrast to the fixed pressure of the machine and must be compensated for in the manufacturing of machine files. It is a well known fact that a file soon becomes dull and worthless if it be constantly stroked over the work without being held to it by pressure enough to keep it cutting. The hand workman's "feel" gives him the advantage over the machine in this point. However the importance of the work to be done must outweigh the economical use of the file and when the machine is required it should be used and

the file maker can produce teeth of the shape that will be far more effective for machine work than the ordinary stock file.

DRAWFILING

Files are sometimes used by grasping at each end and moving them sidewise across the work, after the manner of using the spoke-shave. This operation is known as drawfiling and is usually performed in laying the strokes of turned work lengthwise, instead of circular, as left from the lathe finish, as well as when giving a final fit to the shaft that is to receive a coupling: cases, generally, in which no considerable amount of stock is to be removed, and thus any defects in the principle of construction of arrangement of the teeth of the file are not so readily apparent.

Files as they are ordinarily made are intended to cut when used with a forward stroke, and the same file cannot work smoothly or to the best advantage when moved sidewise, unless care is taken that the face of the teeth present themselves, during the forward movement of the file, at a sufficient angle to cut, instead of scratching the work. To accomplish this, the angle at which the file is held with respect to the line of its movement must vary with different files, depending upon the angle at which the last or up cut is made. The pressure should also be relieved during the back stroke, as in ordinary filing.

When properly used, work may be finished somewhat finer and the scratches more closely congregated than in the ordinary use of the same file: as, in drawfiling, the teeth produce a shearing or shaving cut.

First Use of a File

In economizing the wear of files intended for general purposes, consideration should be given to the kind of material to which they may be subjected in the different stages of their use.

In the ordinary use of the machine shop, the first wear of these files should be in finishing the larger surfaces of cast iron, bronze or brass metals, all of which require a keen cutting tooth; they may then be made to do good execution upon the narrower surfaces of these metals, and also upon wrought iron and soft steel; as a file that has been used more or less upon this kind of work will not tear the surface of these metals and will consequently do more effective work. To obtain the best results, the file suited for general purposes is not so well adapted to filing brass or other similar soft metals as those whose teeth are arranged for this purpose.

New files, particularly double cuts, are severely worn down by use upon narrow surfaces, as the strain comes wholly upon a few teeth and frequently breaks them.

Preparing Work

The corners or thin edges of iron castings are very likely to become chilled and a thin scale or skin produced over the entire surface of the casting, caused by the hot metal coming in contact with the moist sand of the foundry moulds; this outer skin is usually much harder than the metal beneath it, and many times

the thin edges or corners are chilled so as to be harder even than the file itself.

To overcome this hard scale the casting is usually pickled by the foundry before it is sent out—a process of washing the castings in acid and grinding or snagging the edges, or particularly hard parts.

However, the casting, even after being pickled, retains a certain amount of sand and hardness on its surface and this will dull the best file made. Use an old file to break off this scale and clean off the casting and then a good file may be used without danger of injury to it.

The necessity, therefore, of removing this scale and chilled surface becomes readily apparent, and all mechanics who give any consideration to the proper and economical use of the file will be careful to see that the scale and sand are first removed by pickling, and the surfaces which have become chilled by grinding, before applying the file.

When Oil Should Not Be Used

All files, when they leave the manufactory, are covered with oil to prevent them from rusting. While this is not objectionable for many uses to which the file is put, there are cases where the oil should be thoroughly removed, as when the file is to be used in finishing the larger cast iron surfaces which are of a glassy nature; the principal difficulty being to make the file "bite," or keep sufficiently under the surface to prevent glazing; otherwise the action not only hardens or burnishes the surface operated upon, but

dulls the extreme points of the teeth, thus working against the desired end in both particulars.

When Oil May Be Used

Oil may, however, be used to good advantage on new files which are put immediately to work upon narrow fibrous metals of a harder nature; in such cases, it is not uncommon, with good workmen, to fill the teeth with oil and chalk.

Oil is also useful on fine files in the finishing of wrought iron or steel, as by its use, the teeth will not penetrate to the same degree and the disposition to "pin" and scratch the work is materially less than when used dry.

Cleaning the File

The dust and small particles removed from the material operated upon are always more or less liable to clog and fill the teeth. This tendency is especially aggravated when the file is used upon wood, horn, and such other materials as will, upon being mixed with the oil in the teeth, become baked when dry, and thus prevent the teeth from penetrating the work as well as giving them the appearance of being worn and tending to injure them by rust.

In removing oil from the teeth of a new file, a ready way is to rub chalk or charcoal across the teeth and brush thoroughly. By repeating the operation a few times, the oil will be entirely absorbed and the file will be in the best possible condition for use upon cast iron.

When the teeth of files are clogged with wood, or other soft substance which has become baked into them, if the file is held in boiling hot water for a few moments, the imbedded substance becomes so loosened that it may easily be carded out of the teeth. If the operation be quickly performed, any moisture remaining will be readily evaporated by the heat retained in the file.

This cleaning is done in several ways: sometimes, in the finer files, by rubbing the hand over them or by drawing them across the apron of the workman; in others, by striking their edge upon the bench or vise; and again, (which is a more common method with the large files.) by the use of a strip of old or worn out card clothing, tacked to a piece of wood having a handle shape at one end—a device which is usually rudely constructed by the operator.

FILE CARD

FILE BRUSH

The file should be cleaned not only at intervals during its use, but carefully before being laid aside, if the best results are to be attained.

The File Card and File Brush will be found excellent tools, and master mechanics should see that every file user in their employ is furnished with one or the other of these, and insist that they be used, if they wish to economize in the wear of their files.

Copper and Copper Alloys

Metals like copper, or brass with high alloy of copper, require a very sharp keen file, preferably of specially shaped teeth, just as these metals require a sharper pointed, keener lathe or planer tool.

Special work may require a special file, but stock shapes and cuts will usually be found to meet nearly all requirements.

Care In Putting Away

One of the most destructive customs is that of loosely throwing files, fine and coarse, small and large, into a drawer filled with cold chisels, hammers, turning tools, etc., and then throwing the chisels, hammers and other tools on to the files.

When we consider how small a portion of the points of the teeth is worn off by extreme wear when the file is properly used, and that to effectually dull them for some kinds of work requires but slight knocking upon a hard substance, it will be easily seen that the evils of this habit should be more carefully considered by the master mechanic, and suitable provision made to avoid its destructive tendencies.

Testing Machines

A great deal has been said or written about file testing machines for determining the comparative efficiency of various brands of files. File makers have used such machines for many years, not to determine the value of various brands of files, but to prove by an average of several tests the utility of various formations and arrangements of teeth and cut for different kinds of work. This seems to be the true function of any file testing machine.

The Real Test

As a general rule labor cost greatly exceeds tool cost and that tool or file or method of using is most desirable which produces the greatest output for the labor expended, its initial cost usually being in very small ratio to its general result. *Hence the best and fairest test of the value of a file or brand of files is its efficiency per $1.00 of pay roll.*

Summary

Select the proper shape and cut of file for the work.

Handle properly.

Have work properly secured and at a convenient height.

Hold file in a manner to give best control.

Keep pressure on file sufficient to keep it cutting—less for a new file—more as it becomes dulled—but *keep it cutting.*

Keep file clean—a dirty file is a dull file.

Clean surface of work to be filed.

Take good care of your files. Don't abuse them. They are cutting tools.

USES OF FILES

The More Common Files Briefly Described and Their Uses Stated

On this subject it will be our purpose simply to name in so many words the distinguishing characteristics of the more common files and very briefly to state the ordinary uses to which they are applied, with a view to aid the reader in making the proper selection of a file for the work which he has in hand. Our catalogue illustrates all the more generally used files, but the following chapter, in describing the shape and specifying the ordinary lengths, complements the illustrations in the catalogue; at the same time, by showing the section and describing the cut, it does away with the necessity, though not the desirability, of reference to the catalogue.

For the sake of simplicity, we have pursued a regular order throughout our descriptions. First, treating the files collectively, we classify them according to their cross sections, as explained below, under the heads of *quadrangular, circular, triangular and miscellaneous* Sections. Then treating each individual file, the Cross Section is shown; we next specify the Shape or outline of the file, as **Blunt** or **Taper**; then follows the character of the teeth, as **Single, Double** or **Rasp Cut**; we next name the degree of coarseness of the teeth, as **Bastard Cut, Second Cut,** etc.; and last the length in which the file is more generally found is given.

A statement of some of the common lines of work upon which the file is used then concludes the treatment.

We preface this entire chapter with a brief General Description which shows how files are divided and classified, and defines the terms employed. By noting well its remarks and by a constant reference to the cuts and cross sections, the contents of the chapter are the more readily understood and become of much greater value.

GENERAL DESCRIPTION

Files and Rasps have three distinguishing features:

1st. THEIR LENGTH.—Which is always measured exclusive of their tang.

2d. THEIR KIND OR NAME.—Which has reference to the shape or style.

3d. THEIR CUT.—Which has reference not only to the character, but also to the relative degrees of coarseness of the teeth.

LENGTH

The length of a file is the distance between its **heel** (or part of the file where the tang begins) and the **point** (or end opposite). The **tang** (or portion of the file prepared for the reception of the handle) is never included in the length. In general, the length of files bears no fixed proportion to either their width or thickness, even though they be of the same kind.

KIND

By kind, we mean the varied shapes or styles of files which are distinguished by certain technical names, as, for instance, **Flat, Mill, Half-Round,** etc.

The kinds are divided, from the form of their cross sections, into three geometrical classes, namely: Quadrangular sections, Circular sections and Triangular sections. Odd and irregular forms are collected under Miscellaneous sections.

These sections are in turn sub-divided, according to their general contour or outline, into Taper and Blunt.

TAPER.—Designates a file the point of which is more or less reduced in size (both width and thickness) by a gradually narrowing section extending from one-half to two-thirds the length of the file, from the point.

BLUNT.—Designates a file that preserves its sectional shape throughout, from point to tang.

CUT

The cut of files is divided, with reference to the character of the teeth, into **Single Cut, Double Cut,** and **Rasp Cut;** and with reference to the coarseness of the teeth, into **Rough, Coarse, Bastard, Second Cut, Smooth** and **Dead Smooth.**

Regarding the latter we may say very briefly that the coarse and bastard cuts are used upon the coarser, heavier classes of work, while the second cut and smooth are used for the finer grades and for finishing

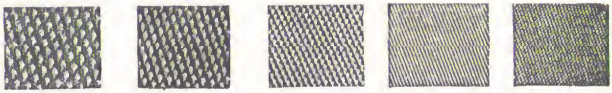
the work started by the coarse and bastard. The rough and dead smooth are seldom called for, but correspond to the above use.

The single cut file is one in which a single, unbroken course of chisel-cuts is made across its surface, arranged parallel to each other but with a horizontal obliquity to the central line.

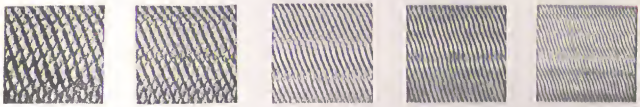
Showing Comparative Cuts of Files with Flat Surfaces—Single Cut, Mill Bastard, Second Cut, and Smooth—10″; Taper and Slim Taper—6″.

The double cut file has two courses of chisel-cuts crossing each other, the second course with rare exceptions being finer than the first.

Showing Comparative Cuts of Files with Flat Surfaces—Double Cut, including Flat, Hand and Pillar, Coarse, Bastard, Second Cut, Smooth, and Dead Smooth, 10″.



Showing Comparative Cuts of Files with Curved Surfaces—Double Cut, including Half Round, and Crossing in Coarse, Bastard, Second Cut, Smooth, and Dead Smooth, 10".



Rasp cut differs from single or double cut in the respect that the teeth are disconnected from each other, each tooth being made by a single pointed tool, called a punch.

Showing Comparative Cuts of Wood and Cabinet Rasps.
12" Wood Rasps Regular, Second Cut and Smooth.
12" Cabinet Rasps, Regular and Smooth.

With this brief description, we proceed to a more detailed explanation of the different kinds of files and to an enumeration of some of their uses, as we have found them applied in various industries.

QUADRANGULAR SECTIONS

MILL FILE. Tapered. Single cut, mostly bastard. Length, 3" to 18".

Use: Principally for sharpening mill-saws; also

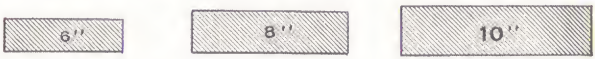
mowing machine knives and plows; in machine shops for lathe work, draw-filing, and, to some extent, finishing the several compositions of brass and bronze.

MILL BLUNT FILE. The above file is also made in a blunt shape.

ROUND EDGE MILL FILE. There is a considerable demand for these files with one round edge, and a limited demand for two round edges. Used for filing the gullet or space between saw teeth.

EQUALING FILE. Made from mill sections and blunt. Double cut, mostly bastard. Length, 6" to 12". Used for general machine-shop work. Seldom called for, except for fine tool making.

FLAT FILE. Taper. Double cut, mostly bastard, though many second cut and smooth, and some dead smooth. Length, 3" to 18".



Use: One of the most common files in use, not confined to any specific kind of work, but employed by mechanics generally, for a great variety of purposes.

FLAT WOOD FILE. Taper. Double cut, coarse. Length, 6" to 16". They are in regular but limited use by wood workers at the present day.

FLAT WOOD RASP. Taper. Rasp cut, bastard. Length, 6" to 16". Use: For wheelwrights and carriage makers.

FLAT SHOE RASP. A form of shoe rasp but little called for.

HAND FILE. Section, 1" advance on Flat. Parallel as to width, taper in thickness. Double cut, bastard mostly, though many second cut and smooth and dead smooth. Length, 3" to 16".

Use: This file is preferred amongst machinists and engineers for finishing flat surfaces, and owing to its shape and its having one safe edge, is particularly useful where the flat file would not answer.

PILLAR FILE. Parallel as to width, taper in thickness. Double cut, same as Hand. Length, 6" to 16".

Use: For general machine-shop use on narrow work.

COTTER BLUNT, COTTER TAPER OR TAPER COTTER. SLOTTING FILE (Blunt.) All made from Pillar sections, the cotters being made from 2" smaller stock. Double cut, mostly bastard. Principally used in filing grooves for cotters, keys or wedges. Seldom called for.

SQUARE FILE. Taper. Double cut, bastard. Length, 3" to 18".

Use: In almost all branches of mechanical industry, principally for enlarging apertures of a square or rectangular shape.

SQUARE BLUNT FILE. Blunt. Double cut, bastard. Length, 10" to 20". Use: By engine builders, and in the shops of railroads and ship-yards, for the rougher work in finishing or enlarging mortises, key-ways, or splines, when of considerable length.

WARDING FILE. Parallel in thickness, much tapered in width. Double cut, mostly bastard. Length, 3" to 10".

Use: Considerably used by jewelers and machinists; but more especially by locksmiths, in filing the ward notches in keys.

DRILL FILE. Cut only upon its edges. Especially adapted to extending or rounding the bottom of slits, where the round file would be found too frail; also as a drill file, for filing small twist drills, and for other purposes of a similar nature.

HORSE RASP PLAIN. Blunt. Rasp cut, coarse. Length, 13" to 18".

Use: For horse and mule shoers.

HORSE RASP PLAIN SLIM. Length, 16", 18", 20".

HORSE RASP TANGED. Same as the above with addition of a tang.

RASPS. (See various headings under CABINET, HORSE and WOOD RASPS.)

CIRCULAR SECTIONS

ROUND FILE. Taper. Cut: mostly bastard. Length, 4" to 18".

Use: For enlarging round holes and shaping internal angles which are filled in, for which uses the quadrangular sections would be unsuitable.

ROUND BLUNT. The Round File is oftentimes made in blunt shape, and is used for the same purpose, but for heavier classes of work.

RAT TAIL FILE. (OR MOUSE TAIL) Another name, sometimes used for a Round File.

GULLETING FILES. Round section, blunt shape. Single cut. Length, 6" to 10". Principally used in extending the gullet of the teeth of what are known as the gullet-tooth and briar-tooth saws. Seldom called for.

HALF ROUND FILE. Taper. Double cut, mostly bastard, though many second cut and smooth, and some dead smooth. Those finer than bastard are cut single on the convex side. Length, 3" to 18"

Use: From its section, this file has a wide use in the machine shop.

HALF ROUND WOOD FILE. Taper. Double cut, coarse. Length, 6" to 16". Use: By wood workers generally and occasionally upon the coarser kinds of brass work.

HALF ROUND WOOD RASP. Taper. Rasp cut, bastard. Length, 6" to 16". Use: Principally by wheelwrights and carriage builders, and to some extent by plumbers and marbleworkers.

HOOK-TOOTH FILE. Blunt. Single cut, bastard. Length, 8" to 10". Used principally in sharpening the

teeth of the cross-cut saws technically called hook-tooth. Seldom called for.

PITSAW FILE. Sometimes ordered as Framesaw. Blunt. Single cut, second cut. Length, $3\frac{1}{2}$" to 10".

Use: For filing the teeth of what are known as pit and frame saws.

CABINET FILE. In section wider and thinner than the Half Round. Taper. Double cut, coarse bastard. Length, 6" to 16".

Used by cabinet makers and other wood workers generally.

CABINET RASP. Rasp cut, second cut. In other respects and uses same as Cabinet Files.

TRIANGULAR SECTIONS

TAPER. (See various headings, as HANDSAW TAPER etc.)

THREE-SQUARE FILE. Taper. Double cut, mostly bastard. Length, 3" to 18".

Use: In machine-shops quite generally for filing internal angles more acute than the rectangle, clearing out square corners, filing up taps, cutters, etc.

HANDSAW TAPER OR TAPER SINGLE CUT. Tapered to a small point. Single cut, second cut. Length, 3" to 10".

Use: As their name implies, much the largest use of these files is in the sharpening of handsaws, which makes them one of the most generally distributed of any file made.

The Handsaw and Three-Square File, while both made from the three-square section, are different in the respect that, in the saw files both single and double cut, the edges before being cut are set to give them the proper bluntness for durability; in the Three-Square File, the edges are left very sharp and not cut, thus making them entirely unfit for the purpose of filing saws.

HANDSAW TAPER DOUBLE CUT OR TAPER DOUBLE CUT. Double cut, second cut. Length, 3" to 6". Use: They are preferred by some in filing

the fine-toothed hand and hack saws, also the metal workers' hack saws, which are considerably harder than those used upon wood.

SLIM HANDSAW TAPER OR SLIM TAPER. Made from three-square section. Taper. Single cut, second cut. Considerably lighter, but in every other respect like the ordinary Handsaw File. Length, 3" to 10".

This file has largely superseded the regular Handsaw File; the principal advantage being the greater sweep or stroke obtainable from the same section.

EXTRA SLIM TAPER.—Lighter stock than slim taper—cut usually single cut, second cut, Generally tapered but occasionally blunt. Length, 4" to 8".

HANDSAW BLUNT. The Handsaw Files are sometimes made in a blunt shape.

DOUBLE-ENDER HANDSAW FILE. Furnished with handle. Single cut, same as Slim Taper. Length, 6" to 12". Use: Same as Slim Taper, with the added advantage of having two files in one and a handle which can be easily attached.

BANDSAW FILE. Same as the regular or Slim Handsaw Files, except with edges rounded. Cut shorter angle than Tapers. Length, 3" to 12". Use: In filing bandsaws, the slenderness of which would hardly admit of the teeth being filed to a sharper bottom.

CANT SAW FILE. Formerly called LIGHTNING Blunt. Single cut, bastard. Length, 4" to 12".

Use: Principally in filing cross-cut saws having M shaped teeth.

KNIFE FILE. Taper. Double cut, mostly bastard. Resemble somewhat when finished the blade of a knife.

Length, 3" to 12".

Use: in limited quantities are in pretty general use in work for which their shape adapts them.

GINSAW FILE. Knife shape. Single cut. The Three-Square Ginsaw is gradually supplanting it.

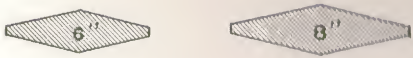
THREE-SQUARE GINSAW FILE. Made of Handsaw Slim steel. Taper or blunt. Single cut. Length, 4". Used for filing cotton ginsaws.

Miscellaneous Sections

Cross or Crossing File. Double oval, one side shaped like Half-round, the other like Cabinet. Cut bastard, second cut and smooth. Length, 6" to 16".

Used as an engineer file.

Feather Edge File. Blunt. Double cut, bastard, second cut and smooth. Length, 4" to 12".



The acute angle of the Knife File corresponding so nearly to those of the Feather Edge, the former will answer for most purposes. Seldom called for.

Half Round Shoe Rasp. Sometimes called Double Improved Shoe Rasp. Cut, file quarters bastard; rasp quarters second cut. Length, 6" to 10".

Use: This form of Shoe Rasp is the one in general use at this time.

CROSS CUT.—Blunt. Cut single cut like Mill Bastard of same size. Lengths, 6" to 12".

REAPER FILE. Of several sections, mostly knife, and all blunt. Single cut, bastard. Use. Principally for sharpening the knives of mowing and reaping machines.

TUMBLER FILE. Double oval shape. Taper or blunt. Cut, double cut, bastard, second cut and smooth. Length, 4" to 14". Seldom called for.

INSERTED TOOTH.—Made from Half-round steel with edges ground off. Cut single cut, second cut like Mill File. Length, 8", 9" and 10". Used for filing inserted tooth saws.

SPECIALTIES

FILE CLEANERS. Consisting of Card, Brush and Scorer together, or Card and Scorer alone. Use. For keeping a file free from filings. The Scorer is made of soft iron, and is used to remove the "pins," which fill up and clog the teeth, causing scratches in the work if not removed. The Brush will be found a most efficient annex to the Card, especially upon finer files, removing the filings much more effectually than can be done by the Card alone.

FILE HOLDERS. A device in which files may be firmly held for service in surface filing, and while

in this condition, readily sprung, in order to give, at the will of the operator, more or less convexity to the working face of the file. In this way, files may be more fully utilized and made to render greater service.

HORSE MOUTH RASPS. A short rasp (or file) having a long handle, used in filing down horses' teeth. In limited use.

FILE HANDLES. As their name indicates, a handle, usually of wood, applied to the tang to afford a firmer and at the same time a more convenient grasp of the file.

MANICURE FILES. Various shapes and lengths, single or double cut. With or without a cleaning point. Occasionally flexible. Used for the care of the finger nails.

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FILE FILOSOPHY

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